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IN THE UNITED STATES RECEIVING OFFICE (RO/US)

JHU/APL Docket No. 1486-SPL

International application No. PCT/US01/06016

International filing date: 23 February 01

Inventors: Carleton S. Hayek, et al.

Applicant: THE JOHNS HOPKINS UNIVERSITY

For: SYSTEM AND METHOD FOR DIAGNOSING PATHOLOGIC HEART CONDITIONS

PRELIMINARY AMENDMENT FOR FILING UNDER 35 USC 371

Assistant Commissioner for Patents  
Box PCT  
Washington, D. C. 20231

Dear Sir:

Please amend the above-identified application as follows:

In the Specification:

Page 1, please amend the Cross-Reference to Related Applications as follows:

**CROSS-REFERENCE TO RELATED APPLICATIONS**

This application claims the benefit of International Application No. PCT/US01/06016, filed February 23, 2001 which claims the benefit of prior filed co-pending U.S. Provisional Patent Application No. 60/184,375, filed on February 23, 2000.

Page 1, insert the Statement of Governmental Interest paragraph after the Cross-Reference to Related Applications paragraph as follows:

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**STATEMENT OF GOVERNMENTAL INTEREST**

This invention was made with Government support under Contract No. DAMD17-97-2-7016 awarded by the Department of the Army. The Government has certain rights in the invention. --

Claims 1-20 remain in the application.

A "Clean" version of page 1 is enclosed.

Respectfully submitted,

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Enclosure: Specification, page 1, "Clean" version

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# TITLE OF THE INVENTION

System and Method For Diagnosing Pathologic Heart Conditions

## CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of International Application No. PCT/US01/06016, filed February 23, 2001 which claims the benefit of prior filed co-pending U.S. Provisional Patent Application No. 60/184,375, filed on February 23, 2000.

## STATEMENT OF GOVERNMENTAL INTEREST

[0002] This invention was made with Government support under Contract No. DAMD17-97-2-7016 awarded by the Department of the Army. The Government has certain rights in the invention.

## BACKGROUND OF THE INVENTION

[0003] The present invention relates to a system and method for diagnosing pathologic heart conditions based upon heart sound data.

[0004] Studies have shown that primary care physicians frequently refer patients to cardiac specialists on the basis of suspicious heart sounds detected by traditional stethoscope auscultation, though a large percentage of these referrals are dismissed by cardiologists as having no pathologic condition. The costs, delays, worry, and administrative burden resulting from these needless referrals could be reduced if the cues that the specialist uses could be incorporated into an algorithm to automatically screen for pathologic heart sounds and murmurs. Although attempts have been made to automate screening by auscultation, no device is currently available to fulfill this function. Multiple indicators of pathology are nonetheless available from heart sounds and can be elicited using certain signal processing techniques such as time-frequency analysis. At least one signal of pathology, the systolic murmur, can reliably be detected and classified as pathologic using a portable electrocardiogram and heart sound measurement unit combined with a time-frequency based algorithm. Time-frequency decomposition analysis holds promise for extending these results to detection and evaluation of other audible pathologic indicators.

[0005] In addition, an automatic screening algorithm would be useful for detecting pathologic heart murmurs in settings where a trained professional is not always available, such as pre sports participation physicals, and examinations performed in remote or underserved areas. Furthermore, automated analysis of digitized clinical information such as heart sounds could have major implications for health care delivery systems using telemedicine.